ROLL NO. _____

Code: CT11 **Subject: DATA STRUCTURE THROUGH C**

ALCCS

Time: 3 Hours **FEBRUARY 2014** **Max. Marks: 100**

PLEASE WRITE YOUR ROLL NO. AT THE SPACE PROVIDED ON EACH PAGE IMMEDIATELY AFTER RECEIVING THE QUESTION PAPER.

NOTE:

- **Question 1 is compulsory and carries 28 marks. Answer any FOUR questions from the rest. Marks are indicated against each question.**
- **Parts of a question should be answered at the same place.**

Q.1 a. Explain solution of Tower of Hanoi problem using recursion.

b. Compare time complexing of Quick and Merge sort.

c. What is the bucket size, when the overlapping and collision occur at the same time?

d. There are 8, 15, 13 and 14 nodes in 4 different trees. Which one of them can form a full binary tree?

e. What pointer type is used to implement the heterogeneous linked list in C?

f. Does the minimum spanning tree of a graph give the shortest distance between any 2 specified nodes? Explain.

g. What is the difference between B-tree and B+ tree? **(7×4)**

Q.2 a. Differentiate between NULL and VOID. **(4)**

b. How can you dynamically allocate a multidimensional array? Write C code. **(6)**

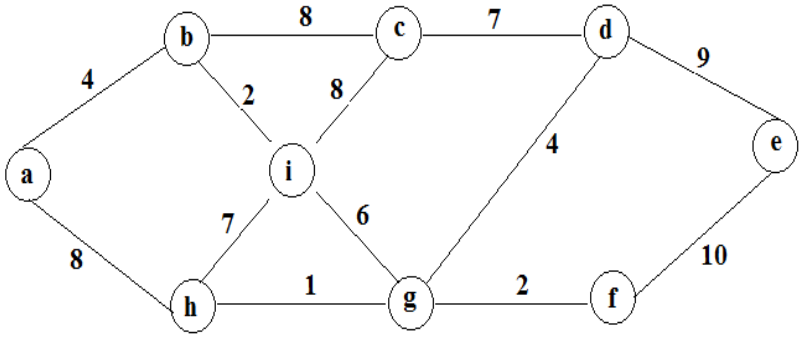
c. Write a C program that read and multiply two matrices. Also write a function that print the matrix. **(8)**

Q.3 a. Write a C program to create a copy of a linked list. **(8)**

b. How a polynomial such as $6x^{170}+4x^{32}-2x+10$ can be represented by linked list? Write an algorithm that reads such a polynomial. **(5)**

c. Explain how two polynomials can be added using linked lists. **(5)**

Q.4 a. Explain Kruskal's algorithm for finding spanning tree of a graph. Find spanning tree of the following graph using this algorithm **(8)**



b. Write a function to compute the maximum depth in a tree? **(10)**

Q.5 a. Find the binary tree whose inorder and preorder traversals is given below:

inorder = g d h b e i a f j c
preorder = a b d g h e i c f j **(9)**

b. The keys 12, 18, 13, 2, 3, 23, 5 and 15 are inserted into an initially empty hash table of length 10 using open addressing with hash function h(k) = k mod 10 and linear probing. What is resultant hash table? **(9)**

Q.6 a. Implement push, pop operation of stack using a linked list. For implementing stack, which one is more preferable – using an array or using a linked list. **(9)**

b. Show the steps of Huffman's algorithm for the following set of frequencies
f: 5 e: 9 c: 12 b: 13 d: 16 a: 45 **(9)**

Q.7 a. The transpose of a directed graph G = (V, E) is the graph $G^T = (V, E^T)$, where $E^T = \{(v, u) \in V \times V : (u, v) \in E\}$. Thus, G^T is G with all its edges reversed. Describe efficient algorithms for computing G^T from G, for both the adjacency list and adjacency matrix representations of G. Analyze the running times of your algorithms. **(9)**

b. What do you mean by buddy system memory allocation? What are its drawbacks? **(9)**